Bi-Scale Radiance Transfer

Abstract

Computer graphics image rendering techniques render images modeling transfer

5   at two scales. A macro-scale is coarsely sampled over an object's surface, providing

global effects like shadows and interreflections cast from an arm onto a body. A meso-

scale is finely sampled over a small patch to provide local texture. Low-order spherical

harmonics represent low-frequency lighting dependence for both scales. To render, a

coefficient vector representing distant source lighting is first transformed at the macro-

10 scale by a matrix at each vertex of a coarse mesh, resulting in vectors representing a

spatially-varying hemisphere of lighting incident to the meso-scale. A radiance transfer

texture specifies the meso-scale response to each lighting basis component, and a

function of a spatial index and a view direction. A dot product of the macro-scale result

vector with the vector looked up from the radiance transfer texture performs the correct

15 shading integral. An id map places radiance transfer texture samples from a small patch

over the object's surface, so that only two scalars are specified at high spatial resolution.

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